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For a more thorough and detailed discussion of these issues please refer to the Coastal Erosion Management Plan (COEMAP) of the Department of Land and Natural Resources (DLNR).

I. Definition of Problem

Coastal property owners bear tremendous risks. Their property is vulnerable to tsunamis, storm surges, floods, high wave impacts, and hurricanes. In addition, owners along the shoreline bear the risk that their property may erode (Coyne et al., in press). Under common law, a riparian land owner “loses title to lands that are submerged through the process of erosion.”¹ The Hawaii Supreme Court has held that “registered ocean front property is subject to the same burdens and incidents as unregistered land, including erosion....[T]he precise location of the high water mark on the ground is subject to change and may always be altered by erosion.”² Because the land seaward of the upper reaches of the wash of the waves — including the beach — is a public trust resource,³ the state, as trustee, can restrain those activities that damage the resource.⁴ A private property owner does not have the right to impair public trust resources.

Tide gauges maintained by the National Oceanic and Atmospheric Administration demonstrate that our islands are experiencing a relative rise in sea level due to both global sea-level rise and local geologic factors (Fletcher, 1992). Additionally, in many places, waves and currents and human activities may reduce, or otherwise negatively impact, the volume of sand along beaches. Processes associated with sea-level rise, wave and current action, and/or human impacts may cause chronic erosion of coastal lands leading to a retreat of the shoreline. It is frequently difficult to distinguish natural from anthropogenic causes of erosion, and the two may often operate together along a particular shoreline. In response shoreline movement may occur slowly at an average annual rate, beaches may erode and recover on a seasonal cycle, or erosion may occur episodically associated with storms at unpredictable times and rates. Erosion is only a problem needing mitigation where human developments along the coast are threatened by shoreline fluctuations.

Armoring the shoreline with seawalls or revetments often stops the erosion of coastal land mauka of the structure. However, where beaches are undergoing long-term retreat, shoreline hardening eventually leads to beach narrowing, followed by beach loss (Hall, 1964; Birkemeier, 1981; Fischer, 1986; Hanson and Kraus, 1986; Komar and McDougal, 1988; Kraus, 1988; Tait and Griggs, 1990; Fletcher et al., 1997; Pope, 1997, and others). A hardened structure tends to shift the focus of erosion from the land to the beach fronting the wall. Seawalls and revetments are not a cure for the cause of erosion, but rather a defensive mechanism to mitigate land loss without regard for resulting impacts to adjacent environments such as the beach or the laterally adjacent shoreline (Raynor, 1953; U.S. Army Corps of Engineers, 1964; Walton and Sensabaugh, 1983; Tait and Griggs, 1990). Shoreline hardening not only leads to beach loss where shorelines are undergoing long-term retreat, but it may also exacerbate the erosion problem on adjacent shorelines through the process of sediment impoundment, or trapping of sand behind the wall. This has the effect of decreasing the overall sand volume available to beaches in the immediate vicinity thus reducing their ability to withstand and recover from normal seasonal wave stresses (Terich, 1975; McDougal, Sturtevant and Komar, 1987; Wood, 1988; Kraus, 1988; Komar and McDougal, 1988; Pope et al., 1997).

Studies of historical vegetation line movement in Hawaii indicate that many coasts are experiencing long-term retreat (Hwang, 1981; Sea Engineering, 1988; Makai Ocean Engineering and Sea Engineering, 1992; Fletcher et al., 1997; Coyne et al., in press) and that many of these coasts have been hardened as a result of the need to stop land loss. The trend of hardening has led to beach narrowing and beach loss on all islands (Hwang and Fletcher, 1992), especially on the islands of Oahu and Maui, where the combination of sea-level rise, sediment deficiencies, wave and current action, and extensive coastal development has resulted in significant beach loss (Hwang and Fletcher, 1992; Fletcher et al., 1997).

II. General Policy

Hardening of the shoreline should be considered the erosion management option of last resort, and its use should be avoided if other options are available. In addition, development in coastal hazard zones, including erosion hazard zones and coastal flood zones should be avoided in order to:

- (1) prevent the inevitable financial and personal hardships that befall individuals and families, and the expenditure of public funds that accompany the occurrence of coastal hazards on developed shorelines;
- (2) prevent the inevitable need to harden the shoreline where there is chronic erosion and the resulting loss of public beaches, lateral shoreline access, open space and view corridors, and littoral sand due to sediment impoundment behind walls;
- (3) mitigate threats to inhabited structures, and public infrastructure from coastal hazards; and
- (4) avoid the need for future public expenditures in responding to damage caused by hurricanes, tsunamis, high wave impacts and other coastal hazards;

III. Response to applications for seawalls, groins and revetments

All decision makers should discourage the construction of seawalls, revetments or other shoreline hardening devices that have the potential to lead to beach loss and that also have the tendency to encourage development in areas of chronic erosion.

As an alternative to a hardened structure, applicants should consider the applicability of coastal dune enhancement, beach and dune restoration, sand replenishment, and other “soft” approaches to mitigating coastal erosion. Applicants should also evaluate the potential for moving dwellings and other structures away from the shoreline as a means of mitigating the effects of erosion. Finally, any application should include the information requested in the attached guidelines for assessing shoreline alteration and hardening projects.

If after a thorough analysis of an application, the decision maker finds by clear and convincing evidence that the impact on public trust resources would be negligible, alternatives to hardening would be impractical, substantial hardship to the applicant is real, and these compelling reasons dictate that a hardened structure should be approved, any approval that is granted should be conditioned on the applicant monitoring shoreline response to the structure. Monitoring should be conducted using standard coastal surveying techniques to document short-term and long term changes in the beach profile both on the subaerial beach and offshore. In order to ensure that planning authorities retain the ability to protect our beaches and because future events may require the removal of seawalls, revetments or groins, all variances and permits should either have an expiration date (subject to renewal), or be revocable upon a finding of environmental impact. In other words, the variance or permit should not confer a vested right to keep the structure in perpetuity.

In general, a variance should be viewed as an extraordinary exception which should be granted sparingly. The reasons to justify approval must be substantial, serious and compelling.⁵

IV. Response to existing illegal seawalls, revetments, groins, or other structure or illegal activity

In assessing whether to remove existing seawalls, revetments and other shoreline hardening devices that have been constructed without proper review and approval, decision makers should consider:

- (1) the impact the structure or activity is having on coastal processes and access;
- (2) the impact of removal of the structure, or cessation of the activity on the coastline;
- (3) the immediate impact of removal of the structure, or cessation of the activity on nearby dwellings; and
- (4) alternatives to the structure or activity which can mitigate erosion impacts;
- (5) the assessment of fines or easement costs to be applied along the coastline as compensation for mitigating the negative impacts of the structure or activity.

Removal should be encouraged where removal will lead to restoration or improvement of coastal resources without causing substantial hardship to the owner, or creating a public hazard.

V. Long-term response to development in coastal hazard zones including erosion and flood hazard zones

So long as construction is allowed in coastal hazard zones, landowners and land managers will face financial burdens and threats to human safety. Where development is allowed in erosion or flood hazard zones, and structures are threatened by erosion or flooding, owners will consider protecting their investments with seawalls and revetments that may have a negative impact of the natural environment. A long-term solution will require that land use decision makers use: public awareness and education efforts; community-based resource protection programs; willing-owner redevelopment plans; hazard avoidance and minimization zoning and planning; and other participant-based and proactive environmental restoration, conservation and hazard avoidance discretionary authority they may have to recover lost coastal resources and mitigate future impacts. When state land use classifications are changed, CDUA's and SMA applications approved, zoning amended or subdivisions approved, conditions should be attached that restrict an applicant's (re)development proposals so that all construction activities occur outside of coastal hazard (erosion and flood) zones and future projected coastal hazard zones and above Base Flood Elevations (BFE's) as mapped by the Federal Emergency Management Agency and updated by state programs, and that beaches and coastal dunes are conserved or enhanced. This in general will require that construction activities recognize adequate, site-specific setbacks from the shoreline and appropriate landscaping and development practices. Applicants are encouraged to refer to the FEMA Coastal Construction Manual for guidelines (to be updated in 2000).

Counties should also consider establishing guidelines and procedures for redeveloping coastal areas where the beach and/or dune has been degraded by shoreline armoring. In the case of Honolulu, the use of Community Facilities Districts to establish enhanced opportunities for funding and implementing a combined beach-dune preservation or restoration system may be useful. Such efforts can translate to significant reductions in the cost of homeowner flood insurance through the National Flood-Insurance Program (NFIP) Community Rating System (CRS).

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Guidelines for Assessing Shoreline Alteration and Hardening Projects

It is the policy of the State of Hawaii under HRS Chapter 205A to discourage all shoreline hardening that may affect access to, or the configuration of, our island beaches.

Any Environmental Assessment prepared in conjunction with an application to construct a seawall, revetment or similar structure, or an activity that will alter in any way littoral processes affecting the shoreline, should be accompanied by appropriate justification and detailed studies including, but not limited to, the following:

1. Historical shoreline analysis of coastal erosion and accretion rates

This should include a description of all movements of the neighboring shoreline over at least the past 30 years. This analysis should be based, at least in part, on aerial photographs available through government agencies and private vendors.⁶ The analysis should provide a detailed history of erosion and accretion patterns using all available evidence. This analysis should include descriptions of shoreline erosion rates, a map (with scale, north arrow, and title) showing past positions of the

shoreline in the project area, and an analysis of the causes of erosion. It is especially important to describe how the project will mitigate the cause(s) of erosion, and avoid exacerbating erosion on the adjacent shoreline.

2. Shoreline type

A description of the nature of the affected shoreline, whether sandy, rocky, mud flats or any other configuration. The history and characteristics of adjoining sand dunes, streams and channels, and reefs should be included.

3. Site maps

Submit maps with title, north arrow and scale, and photographs that clearly show the current certified shoreline, previous certified shorelines, the private property line and the location of the proposed structure. Any nearby public access right-of-way should also be depicted. Applicants should also include a color copy of a color vertical aerial photograph⁷ that shows the project area and the adjacent offshore region. The applicant may wish to identify important components of the project on the color photo. Color aerial photos exist for most of the shoreline area of Hawaii and often clearly show important geologic and geographic features that are critical to fully evaluating the environmental context, and even the likelihood of success, of a proposed project. Evaluation of an aerial photo of a project site can be an important tool yielding significant information relevant to the applicants planning efforts.

4. Beach profiles

Submit beach profiles that extend offshore at appropriate intervals along the beach indicating the width and slope of both the submerged and dry portions of the beach and showing major features of the beach. Profiles should extend from the mauka toe of the primary dune to the offshore depth of closure of profile fluctuations.⁸

5. Existing walls

Submit an analysis of any existing nearby walls or revetments and their cumulative impacts on the shoreline.

6. Description of improvements

A description of structures and improvements (such as homes or swimming pools) on the subject property, their distance from the property line and shoreline, how they may be affected by the construction of the proposed hardening project, and the specific feasibility of relocating them as a hazard mitigation activity.

7. Coastal hazard history

A coastal hazard analysis for the area in question. This should include any relevant coastal processes such as hazardous currents and seasonal wave patterns, including a description of the recent incidence of damaging high waves, high winds or water levels from storms, vulnerability to tsunamis, and the best estimate of Base Flood Elevations and flood zone designation as mapped by the FEMA Flood Insurance Rate Maps.

8. Waves and currents

A description of the wave and current regime acting along the shoreline in question, including, a wave refraction analysis (one simple form of this analysis is to describe wave crest patterns as shown in an aerial photograph), a description of littoral currents and their seasonal patterns and the impact of the proposed activity on these patterns.

9. Sediment movement

If the proposed activity involves any action that may interfere with the normal pattern of sediment transport along the coast, or alter in any way the morphology of the shoreline or the resident sand volume, applicants must submit a description of these alterations and their impact on shoreline processes including an estimate of the annual volume of sediment in transport and seasonal patterns of transport, and whether these impacts may have any deleterious effects on neighboring shoreline segments.

10. Thirty-year erosion hazard

An analysis that uses annual erosion rate data to project the location of the 30-yr erosion hazard zone as measured from the certified shoreline or vegetation line in the absence of any shoreline stabilization structures. This information should be provided in the form of a mapped line or zone, and accompany text descriptions. The analysis may be combined with items 1 or 3, or submitted independently.

11. Photographs

Eye-level (taken by an individual standing on the ground) photos of the site that illustrate past and present conditions and locate the proposed structure.

12. Alternatives

All alternatives to shoreline hardening should be thoroughly researched and analyzed. These alternatives should include beach and/or dune restoration using sand replenishment, retreat from the shoreline by moving existing structures inland, and a no action alternative.

13. P.E. Seal

The seal of a Professional Engineer (P.E.) with experience in the area of coastal engineering should be included with any technical plans for a shoreline hardening structure that accompany the application. The inclusion of this information will help make an Environmental Assessment complete and meet the requirements of Chapter 343, HRS. Only after thorough study and analysis should any permit for shoreline hardening be considered.

NOTES

1. R.R. Powell 5A Powell on Real Property ° 66.01 [2] (1994).
2. County of Hawaii v. Sotomura. 55 Haw. 176, 180 (1973).
3. Application of Sanborn. 57 Haw. 585, 562.
4. Orion Corp. v. State 747 P.2d 1062 (Wash. 1987); U.S. v. State Water Resources Control Board. 227 Cal. Rptr 161 (Cal. App. 1 Dist 1986); State Dept. of Environmental Protection v. Jersey Central P & C Co. 308 A.2d 671 (N.J. Super L. 1973).
5. R.R. Powell 6 Powell on Real Property ° 79c.16[1] (1995).
6. Aerial photographs may be obtained from Air Surveys Hawaii, Inc.; Towill, R.M., Corp.; City and County of Honolulu, Coastal Lands Program, Department of Planning and Permitting; DBEDT, Office of Planning; and the various planning and permitting departments in each county.
7. Color vertical aerial photographs usually can be purchased at reasonable price from Air Surveys Hawaii, Inc.
8. Note: Please refer to U.S. Army Corps of Engineers Coastal Engineering Technical Notices II-31 (11/93), II-40, 3/98, and other relevant documents for guidance.